Yarmouk University

Faculty of Economics and Administrative Sciences

Department of Banking and Finance

"Testing The Partial Adjustment Model of Optimal Cash Holding : Evidence From Amman Stock Exchange"

"اختبار نموذج التعديل الجزئي للمستوى النقدي الأمثل (دليل عملي من بورصة عمان)"

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Program : Master in Finance & Banking Science

February 7, 2013

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A thesis submitted in partial fulfillment of the requirements for the degree of Master in Banking and Finance sciences in the Department of Banking and Finance sciences, Yarmouk University, Irbid , Jordan.

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DEDICATION

الإهداء

خيـــر مـــا أبـــدأ فيـــه الكـــلام هـــو الحمـــد والثنـــاء لله عـــز وجـــل ...
فالحمد لله رب العالمين.. الذي أعانني على إتمام هذا العمل
الحمد لله رب العالمين.. صاحب العظمة والكبرياء والصلاة والسلام على أشرف المرسلين سيدنا محمـــد النبـــي الأمـــين وعلـــى آلـــه وصـــحبه ومـــن اهتـــدى بهـــداه

أما بعد فأهدي عملي هذا إلى كل من ساعدني ، أهدي هذا الجهد المتواضع
إلـــى مـــن أمرنـــي الله ببرهمـــا والإحـــسان إليهمـــا
أبي وأمي........
إليكما يا والدي الحبيبان يا أغلى الناس ، يا من أنتما في نظري أعظم وأجمل وأغلى من عرفت في هذه الدنيا
أهدي هذه الرسالة لكما لتكون رسالة شكر وعرفان تقديرا لجهودكما التي لا تقدر بكنوز الدنيا كلها ، لن أفيكم حقكم مهما قلت أو كتبت
أبي وأمي الغاليان ، أسال الله أن يطيل في عمركما ويبارك في حياتكما ، وأن يعينني على بركما

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يا من وقفت بجانبي ولم تتخلى عني لحظة ،أنت أحق الناس بالشكر والثناء فلولاك ما كنت لأنجز هذا العمل ..

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Abstract

Yosef, nadia Jawdat. Testing the Partial Adjustment Model of Optimal Cash Holding: Evidence from Amman Stock Exchange

Department of Finance and Banking

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(Supervisor: Dr. Ziad Zurigat).

This study aims at testing the partial adjustment model of cash holdings to investigate whether Jordanian industrial firms have a target cash holdings and move gradually toward that target when any deviation exists based on a sample of 57 industrial firms listed on the Amman Stock Exchange (ASE) from the period 2001-2010. Using the estimated fitted values from the conventional cash equation as proxy for the target cash holding, the study provides evidence suggesting that cash flows, net working capital, leverage and firm size significantly affect the cash holdings in Jordanian firms. Moreover, the estimation result of partial adjustment model shows that Jordanian industrial firms have a target cash level and make a target reversion whenever needed. However, Jordanian industrial firms adjust their actual cash holdings to its target level too slowly. Given these findings, the study recommends to develop capital market, increase its efficiency, competitions and transparency to increase firms' ability to generate funds externally without the need for holding excess cash because of the potential agency problem. It also recommends future studies to explore the impact of cash holding on corporate profitability and performance.

Keywords: Cash Holdings, Trade-off Theory, Pecking order Theory, Agency Theory of Free cash flow, Partial Adjustment model.

ملخص الدراسة

يوسف، نادية جودت. اختبار نموذج التعديل الجزئي للمستوى النقدي الأمثل (دليل عملي من بورصة عمان) ، رسالة ماجستير بجامعة اليرموك، 2013

إشراف : د . زياد محمد زريقات

هدفت هذه الدراسة إلى اختبار نموذج التعديل الجزئي للسيولة النقدية للتحقق في ما إذا كانت الشركات الصناعية الأردنية لديها مستوى أمثل للسيولة النقدية وأنها تنتقل تدريجياً نحو هذا المستوى الأمثل عند الانحراف عنه بناءاً على عينة مكونة من 57 شركة صناعية مدرجة في بورصة عمان (ASE)من الفترة 2001-2010. باستخدام القيم المقدرة من المعادلة النقدية التقليدية كمقياس للمستوى المستهدف من السيولة النقدية، توصلت هذه الدراسة إلى أن التدفقات النقدية وصافي رأس المال العامل والمديونية و حجم الشركة تؤثر تأثيرا كبيرا على السيولة النقدية في الشركات الأردنية. وتبين نتائج تقدير نموذج التعديل الجزئي أن الشركات الصناعية الأردنية لديها مستوى أمثل من السيولة النقدية وأنها تعود إلى هذا المستوى كلما دعت الحاجة. ومع ذلك،فإن الشركات الصناعية الأردنية تضبط مستويات السيولة الفعلية لديها إلى مستوى هدفها الأمثل ببطء شديد. وفي ضوء هذه النتائج، توصي الدراسة بتطوير سوق رأس المال، وزيادة الكفاءة، والمنافسة والشفافية في السوق لزيادة قدرة الشركات على الحصول التمويل الخارجي دون الحاجة للاحتفاظ بالسيولة الزائدة والتي قد تكون السبب في مشكلة الوكالة المحتملة . كما توصي بإجراء دراسات مستقبلية لاستكشاف أثر السيولة النقدية على ربحية الشركات وأدائها.

كلمات مفتاحيه : السيولة النقدية، نظرية المقايضة ،نظرية الأولويات المرتبة لمصادر التمويل ، نظرية الوكالة للتدفق النقدي الحر ، نموذج التعديل الجزئي.

Chapter One

Introduction

1-1 Introduction

It is well –known that Modigliani and Miller (1958) posit that the value of a firm is independent of its capital structure; more precisely, the value is not affected by the way of financing. The underlying assumption behind their statement is the perfection of capital market in which there is no market frictions exist, such as tax, bankruptcy, agency and information costs. Moreover, debt is riskless; regardless of the amount of debt used for financing. The perfection assumption of capital market suggests that firms should not show any preferences of internal over external financing. Both internal and external financing are perfectly substitute for each other. Consequently, there is no need for holding cash to meet any shortage in external financing as long as external funds can be raised at any time needed.

It is worth noting that the statement of Modigliani & Miller (1958) makes dividends, leverage and investment decisions irrelevant to firm's value. Therefore, Modigliani & Miller (1958) state that profitability of new investment opportunities is the only determinant of the firm's value.

On the other hand, when frictions exist, capital markets are no longer perfect. This may restrict the firm's ability to generate funds externally. Hence, external and internal financing are not perfect substitute for each other. Consequently the need for holding cash increases in order to avoid under investment problem that might arise because of the presence of agency and bankruptcy costs of using external financing (Jensen & Meckling 1976).

Opler *et al.* (1999) and Bates *et al.* (2009) report the incentives that may induce firms to hold cash. Besides the agency incentive, firms hold cash (1) to meet firms' daily activities (transaction motives), (2) to meet emergency needs (Precautionary motives) and (3) for taxes associated with payouts.

The most relevant theoretical models that can explain the determinants of the cash holding level are the trade-off theory, the pecking order theory and the agency theory. According to the trade off theory, firms trade off the costs and benefits of cash holdings to maximize the value, implying that the presence of cash holding costs may outweigh its benefits.[1] This suggests that there is some threshold level of cash holdings under which the firm's value is maximized. This threshold of cash is generally called the optimal (target) level of cash holdings. Hence, the observed cash holding is not always the optimal level which

[1] The benefits of holding cash are the reduction of transaction cost for precautionary needs and the cash allowance for speculation, while, the costs are the opportunity cost and liquidity premium.

increases the necessity of target adjustment when deviation from that target exists.

With respect of pecking order theory, issuing new equity is very costly for firms because of information asymmetries. Therefore, firms finance their new investment opportunities primarily with internal funds, then with debt and finally with equities as the last resort. Extending the pecking order theory of Myers & Majluf (1984) and Myers (1984) to explain what determine cash holdings leads to the conclusion that there is no optimal cash level but cash is used as a buffer between retained earnings and investment needs, implying that cash level would just be the result of financing and investment decisions. Few studies provide evidence supporting the prediction of pecking order theory such as Kalcheva & Lins (2003) who conclude that cash is positively related to the growth opportunities of the company, its size and cash flow. Whilst, negatively related to the level of debt and capital expenditures.

The agency theory of Jensen & Meckling (1976) provides another explanation as to why firms hold cash. It states that managers hold cash and other liquid assets in order to minimize the cost of external finance. Dittmar *et al.* (2003) find evidence suggesting that firms hold more cash in countries with greater agency problems. Dittmar & Mahrt-Smith (2007) and Pinkowitz *et al.* (2006) find that cash is worth less, when agency problems between insiders and outside shareholders are greater.

Although a cash holdings is considered as one of the most important topics of corporate finance, there are few studies focused on the partial adjustment of corporate cash holding. Most of studies focused on investigating the determinants of firms' cash level, mainly of large public and private firms in developed economies (i.e. Ozkan & Ozkan, 2004 and Alles *et al.,* 2012). Therefore, this study tries to investigates not only the determinants of cash holdings , but also the dynamic cash holdings model by testing the partial adjustment model of cash holdings using sample of Jordanian industrial firms listed on ASE over the period of (2001- 2010).

1-2 Problem of the study

It has been argued that the presence of market frictions such as bankruptcy, information asymmetric and agency costs make the capital market imperfect. As a result, the cost of external financing is higher than that of internal financing which may increase the need for cash holdings. Acharya *et al.* (2005), suggest that in the presence of financing frictions, cash plays a separate role and should therefore be managed and studied in its own right. The main problem in developing countries in general is the lack of sources of funds and the reliance on internal financing to take the advantages of investment opportunities.

In Jordan, the capital market has been described as imperfect, less developed and all frictions are relevant and may affect the firm's investment, financing and dividend policy decisions. This, along with the

fact that banks credit policy is largely affected by the uncertainty condition in the world and region. Such conditions make Jordanian firms show a preference of internal over external financing and increases the need for holding cash. Therefore, the key questions are: Do Jordanian firms have a target cash ratio? If so, what determines that target? And how fast they move toward it if any deviation exists?

1-3 Importance of the study

In the current era, there has been growing interest in corporate cash holdings. This growing attention comes from the fact that cash is already an important part on corporate balance sheets.

Most recent research have focused on estimating determinants of cash holding. Less attention has been paid toward testing the partial adjustment model of cash holdings. In spite the fact that some of these studies have stated that target cash ratio exists, proving that cash holdings decisions follow a partial adjustment model, there is no empirical evidence to justify why firms follow a partial adjustment model (Garcia-Teruel & Martinez-Solano, 2008).

Hence, the importance of this study stems from testing the partial adjustment for cash holding in Jordan as one of developing country in an emerging economy. The movement of the Jordanian economy towards the free market economy may provide an opportunities for Jordanian

firms to optimally determine their cash holdings and move gradually toward their target level if any deviation exists.

To the best of the researcher knowledge, the current study is the first one that attempts to test the dynamic model of cash holding which allow for examining the cross –sectional variation and the time series behavior of cash holding in Jordan. Moreover, the study covers a period where the ASE has witnessed remarkable developments as a result of implementing the comprehensive economic and financial liberalization reform in 1990. This program has aimed at integrating ASE with international capital market to enhance its competition and liquidity by increasing the level of transparency and investors protection.

1-4 Objectives of the study

The aim of this study is to investigate whether Jordanian industrial companies have target cash holdings and how fast they move toward that target if any deviations exists by testing the partial adjustment model of cash holding using a sample of 57 Jordanian Industrial firms listed on the ASE during the period of 2001-2010. As the target cash holdings is unobservable, the current study uses fitted values estimated by using the conventional cash equation as a proxy for target cash holdings level. It also aims at investigating the main determinants of optimal cash holdings.

1-5 Structure of the study

This study will contain five chapters. Beginning with chapter one that includes the introduction, importance, objectives, and problem of the study. The second chapter covers the theoretical framework and literature review of cash holdings and the speed of adjustment. The third chapter contains a description of the data and the methodology used to estimate the partial adjustment. The fourth chapter presents the main results of the study. The fifth chapter summarizes the results and recommendations.

Chapter Two

Theoretical Framework and Literature Review

2-1 Introduction

The theoretical background of cash holdings refers to Modigliani & Miller (1958) who stated that, under the perfection assumption of capital market, holding large amounts of cash is irrelevant because all companies can borrow and lend at the same rate and can easily finance their profitable investment projects at negligible transaction costs. The absence of market frictions such as transaction, bankruptcy, agency and information costs makes firms show no preferences of internal financing over external financing. Hence, the firm's decision to hold cash is not related to, or affected by other financial decisions.

However, when transaction costs, agency costs and information asymmetries are considered, firms' investment decisions become highly sensitive to the cash holdings.[2] This suggests that the firm's decision to hold cash is largely affected by capital market frictions. More precisely, it is largely affected by the costs and benefits of cash holding when firms are restricted to raise funds externally, implying that there is an optimal cash level that balances costs and benefits and thus maximizes the firm's

[2] Gill and Shah (2012:pp70) define cash holding as cash in hand or readily available for investment in physical assets and to distribute to investors. Cash holding is also viewed by Ogundipe and Ajao (2012:pp45) as" cash or cash equivalent that can be easily converted into cash".

value (Garcia-Teruel & Martinez-Solano, 2008). Moreover, empirical evidence shows that any deviations from the optimal level reduce firm value . This implies that firms can increase their market value merely by being around the optimal level of cash, which seems consistent according to the trade-off between benefits and cost of cash holdings. This implies that value-maximizing firms will gradually adjust their actual cash holding toward their target level (Garcia-Teruel & Martinez-Solano, 2008).

The principle benefit of cash holdings according to Saddour (2006) is to enables firms to undertake their profitable investments projects without raising outside funds at high transaction costs. In addition, Cossin & Hricko (2004) argue that cash holdings allow for optimal timing of investments and to avoid the under pricing issue. Likewise, Acharya *et al.* (2005) provide an evidence suggesting that cash balances secure investment through hedging against cash flow deficits. Moreover, corporations hold cash to pay for a firm's financial obligations (Baskin 1987), and to provide for self insurance against unknown hazards (Swanson 2005).

However, holding cash has a cost that may outweigh its benefit. The main cost is the opportunity cost of capital invested in liquid assets instead of in other assets with a higher return. Hence, firms tend to hold the optimal cash balance that minimizes the total cost of holding cash by

identifying the optimal or target level of cash at the point where the marginal cost of any additional unit of cash used equates it marginal benefits (Miller & Orr, 1966). In the following section, the theoretical background and motivation of cash holdings are discussed.

2-2 Theories and motivation of cash holdings

2-2-1 Theories of cash holdings

Afza and Adnan (2007) state that corporate cash holding decisions are usually explained under three theories, namely, tradeoff model, pecking order theory and agency theory of free cash flow.

According to Miller and Orr (1966), who develop the trade-off model, companies must determine the optimal level of cash holdings by trading off the marginal cost of holding liquid assets with its marginal benefit. The main benefits associated with cash holdings include the reduction in the possibility of financial distress, meeting the optimal investment policy given the financial constraints of raising funds externally and consequently, allowing firms to invest in positive NPV projects (Ferreira & Vilela, 2004). While the marginal cost of holding cash is associated with the opportunity cost of the capital due to the low return on liquid assets (Miller & Orr, 1966). Since, Firm's optimal cash holdings can be viewed as being determined by a tradeoff between costs and benefits of having liquid assets to derive optimal cash level. Kim *et al*. (1998) develop a theoretical model of corporate liquidity based on the tradeoff

between the value of being able to internally finance with cash and relatively low return of holding cash. Their empirical findings support that firms which face higher costs of external financing hold higher amounts of cash.

However, the observed cash holdings is not always the optimal or target level. Firms may face target deviations and require gradual adjustment to correct that deviations. The speed in which deviations are corrected depends on the cost and benefit of moving toward the target or being away from the target. More precisely, the target adjustment theory of cash holding suggests that firms trade-off the costs of being away from the target with the costs of moving toward that target (adjustment costs). The firms will have the incentive to move toward the target if costs of being away from the target are higher than moving toward the target (the adjustment costs).

The Pecking order theory (or financing hierarchy theory) does not assume neither an optimal debt nor an optimal level of cash holdings for the firm (Myers, 1984; Myers & Majluf ,1984). However, it explains why firms let their cash holding to determine their capital structure and then investment decisions. Myers and Majluf (1984) argue that, in the presence of information asymmetries, insiders have more valuable information than outsiders who anticipate and interpret managers' financing decisions as a bad signal and pricing new issues accordingly.

Myers (1984) uses asymmetric information hypothesis of Myers and Majluf (1984) to develop his pecking order theory of capital structure which is valid to explain why firms hold cash. The underlying argument of pecking order theory is that, the adverse selection of information asymmetries will be lower for debt than for equity with no adverse selection costs of retained earnings. Therefore, it predicts that firms will follow the hierarchy with respect to source of financings, starting first with retained earnings as the cheaper source, then with safe debt and risky debt, and finally with equity to minimize asymmetric information costs and other financing costs. Myers' theory suggests that firms do not have target cash levels, but cash is used as a buffer between retained earnings and investment needs. Ferreira and Vilela (2004) use size and cash flow to empirically test this theory.

The agency theory of free cash flow (Jensen, 1986) provides another explanation as to why firms hold cash. The modern framework of agency theory referred to Jensen and Meckling (1976) who state that the agency relationship is a result of the separation between management and ownership of the firm. However, the separation of ownership and management provides managers with incentive to achieve their personal goals while ignoring those of stockholders. This conflict of interest creates agency costs that are totally incurred by stockholders who work for mitigating their effects on value and thereby wealth. Agency costs are

the costs incurred by stockholders to assure that managers acting in the interest of stockholders such as monitoring costs, bonding costs and residual loss when stockholders' returns fall below what is expected (Jensen & Meckling, 1976). Jensen (1986) defines free-cash flow as the remaining cash flows after funding positive NPV projects. Jensen (1986) argues that agency costs are magnified when firms have free cash flows. Thus, because excess cash holdings allow self-serving managers to avoid the discipline of the capital markets, investing in cash can have detrimental effects on the firms value. Subsequently, this harms the interest of stockholders**.** Therefore, Jensen (1986**)** suggests the use of debt and dividends to reduce the amount of free cash flows under management controls.

However, using debt to reduce agency costs of free cash flow creates another conflict of interest between stockholders and debt holders. This conflict forces funds' providers to demand risk premium. This increases the cost of debt financing and consequently induces firms to forgo some of their valuable investment opportunities (Myers, 1984). The presence of agency costs of both debt and free cash flows make the cost of external funds higher than that of internal funds. This, along with other market frictions such as information asymmetries, increases the firm reliance on internally generated funds and hence, induces managers to holds more liquid assets.

In summary, the agency theory predicts that managers hold cash to increase the amount of assets under their control and to gain discretionary power over the firm investment decision. In addition, cash reduces the pressure to perform well and allows managers to invest in projects that best suit their own interests, but may not be in the shareholders best interest and could have a negative impact on shareholders wealth (Ferreira & Vilela, 2004).

According to Alles *et al.* (2012), tradeoff model, pecking order theory and agency theory of free cash flow complement each other and work together to explain the existence of target cash level. There is some empirical evidence of the compatibility of these theories. Bruinshoofd and Kool (2004), find that changes in the corporate liquidity in the short run could be explained by the pecking-order theory, while the existence of a target liquidity level in the long run could be explained by the static trade-off theory. Bigelli and Sanchez-Vidal (2009) provide an evidence that support both the static trade-off theory and pecking-order theory.

Since, the three theories' predictions of the relationship between corporate liquidity and its determinants are not mutually exclusive, it is difficult to empirically support one theory over the others unambiguously (Chen & Mahajan, 2010).

2-2-2 Motivation of cash holdings

According to Gill and Shah (2011), the most important incentives for holding cash are:

1- **Transaction motive:** cash is held for day-to-day operations; such as paying for goods, services, labor and service debt. Keynes (1936) argues that firms with limited internal resources tend to increase their funds by liquidating assets, issuing new equity or debt, and cutting dividends.

2- **Precautionary motive:** This refers to hold cash for safety reasons; that is, cash balance is held in reserve for unexpected fluctuations. Opler *et al.* (1999) find that firms with riskier cash flows and poor access to external capital hold more cash. The precautionary motive also predicts that firms with better investment opportunities hold more cash because adverse shocks and financial distress are more costly for them (Myers & Majluf, 1984).

3- **Speculation motive:** Corporations hold cash balance to take advantages of any bargain purchases that may arise, attractive interest rates and favorable exchange rate fluctuations (Ross *et al.,* 2002). Some firms hold cash in excess than transaction and precautionary needs to involve in speculation. Speculative needs for holding cash require that a firm may have some profitable

opportunities to exploit, which are out of the normal course of business (Besley & Brigham, 2005).

2-3 Empirical studies

The topic of cash holdings has attracted the attention of most researchers in the world. However in Jordan, the growing interest in this field is due to the liberalization of capital market and the trend toward the globalization. Cash holding is important because it provides corporations with the required liquidity as cash is the most liquid assets from all other assets. Thus, cash is the major component that enables firms to survive and continue.

Empirical studies on corporate cash holdings have identified a number of firm-specific factors that might influence the target level of cash holdings and that can explain differences in the adjustment speed to the desired cash holdings in many developed economies.

2-3-1 Empirical evidence on determinants of cash holdings

This section reviews the main literature on firm specific factors that determine the cash holdings which have mainly focused on US firms and other developing markets. The theoretical models have different points of view as to how the firm specific factors influence cash holdings decisions.

However, until now, and to the researcher's best of knowledge, no recent study undertaken on the Jordanian capital market addressed the partial adjustment of cash holdings. The only study concerning cash holdings of Jordanian firms conducted by Refaee (2012). She estimates the determinants of cash holding for Jordanian industrial firms for the period from 2000 to 2009 by using Pooled & Panel Data Analysis. The results of the study show that Jordanian industrial firms, on average, keep in with 6.5% of their total assets as cash or cash equivalents. She finds that cash holding is affected by investment opportunity, firm size, profitability, availability of liquid asset substitutes and debt ratio. Capital expenditure has no effect on cash holding. She confirms the existence of the agency problem by investigating negative relationship between investment opportunity and cash levels.

The majority of previous studies focus their analysis on the determinants of cash holdings in large firms listed on the financial markets. The empirical research reveal that the firm specific factors affecting the corporate cash holdings have differing relationship across different countries and firm sizes. Moreover, the behavior of these factors have been changing over time (Afza & Adnan, 2007). Several studies have examined firms' cash policy by estimating cash balances and their determinants. The most important previous studies related to the determinants of cash holdings are summarized in table (2-1).

Table (2-1) Summary of empirical studies related to the determinants of cash holdings

Author(s)	Countries	Findings
Opler *et al*. (1999)	USA	They find that firm's cash holdings are negatively related to size, net working capital, leverage, dividend payment, and government regulation while they are positively related to the cash flow-to-assets ratio, the capital expenditures-to-assets ratio, industry volatility, and the R&D-to-sales ratio.
Pinkowitz &Williamson (2001)	USA Japan Germany	The cross country analysis shows that Japanese firms tend to hold more cash than American or German counterparts do. While cash holding pattern is similar across German and US firms, the OLS regression analysis reveal that Japanese cash balances are significantly influenced by the monopoly power of the banks.
Ferreira & Vilela (2004)	Economic and Monetary Union(EMU)	Their results suggest that cash holdings are positively affected by the investment opportunity set and cash flows and negatively affected by asset's liquidity, leverage, firm size and bank debt. They also find that capital markets development has a negative impact on cash levels, contrary to the agency view. Their study indicates that the coefficients of several firm characteristics are consistent with the static trade-off theory, while others are consistent with the pecking-order theory.
Nguyen (2005)	Japan	He finds that cash holdings are positively associated with firm level risk, but negatively related to industrial risk. He also finds that cash holding decreases with the firm's size and debt ratio, and increases with its profitability, growth prospects, and dividend payout ratio.
Hofmann (2006)	New Zealand	Determinants of corporate cash holdings in New Zealand are firms' growth opportunities, the variability of its cash flows, leverage, dividend payments, and the availability of liquid asset substitute. While growth opportunities and the variability of cash flows are positively related to cash holdings, large dividend payments and liquid asset substitutes indicate lower cash holdings.
Saddour (2006)	France	He finds that French growth companies hold higher cash levels than mature companies. For growth companies, there is a negative relationship between cash and the firm's size, level of liquid assets and short term debt. The cash level of mature companies increases with size, investment level, and the payout to shareholders in the form of dividends or stock repurchases, and decreases with trade credit and expenses on research and development. He finds that both trade-off and pecking order theories play an important role in explaining the determinants of cash holdings of growth and mature French firms.
Afza & Adnan (2007)	Pakistan	They find negative relationships between market-to-book ratio, net working capital, leverage, dividends, and cash holdings, and positive relationships between firm size, cash flow, and cash holdings.

Hardin III *et al.* (2009)	USA	They find that cash holdings are inversely related to funds from operations, leverage and internal advisement, and are directly related to the cost of external finance and growth opportunities. Cash holdings are also negatively associated with credit line access and use.
Bates *et al.*(2009)	USA	They find that the main factors that contribute for the increase in the cash ratio are that inventories have fallen, cash flow risk for firms has increased, capital expenditures have fallen, and R&D expenditures have increased. They argue that the precautionary motive for cash holdings plays an important role in explaining the increase in cash ratios.
Megginson & Wei (2010)	China	They find that smaller, more profitable and high growth firms hold more cash. Debt and net working capital are negatively related to cash holdings.
Chen & Mahajan (2010)	EMU Countries	Their results show that macroeconomic variables like GDP growth rate, inflation, short-term interest rate and government deficit affect corporate cash holdings. Expectations of future economic conditions also affect cash holdings.
Kim *et al.* (2011)	USA	Their results reveal that firms with greater investment opportunities tend to hold more cash while firms holding liquid assets other than cash, higher capital expenditures and higher dividend pay-out hold less cash. Precautionary and transaction motives were found to be playing important roles in explaining the determinants of cash holdings for restaurant firms.
Rizwan & Javed (2011)	Pakistan	They find that cash holdings of Pakistani firms' are positively related to cash flow and market-to-book ratio while net working capital and leverage are negatively related to corporate cash holdings.
Ogundipe *et al.* (2012)	Nigeria	The results show that cash flow, net working capital, leverage, profitability and investment in capital expenditure significantly affect the corporate cash holdings in Nigeria. However, there is insignificant relation between growth opportunities and size and cash holding in Nigeria.
Gill & Shah (2012)	Canada	They show that market-to-book ratio, cash flow, net working capital, leverage, firm size, board size, and the CEO (chief executive officer) significantly affect the corporate cash holdings in Canada.

In summary, most of the literature review have aimed to test the determinant factors of firms' cash levels indicating that market-to-book ratio, cash flow, net working capital, leverage, firm size, dividends and growth opportunity determine corporate cash holdings.

Since a vast amount of research have been found to investigate determinants of cash holdings, but the partial adjustment of cash holdings is rarely involved. The following section will shed light on the theoretical back ground of the speed of adjustment toward the target cash holdings.

2-3-2 Empirical evidence on target adjustment theory

According to Opler *et al.* (1999), firms have an optimal level of cash holdings and the firm's optimal cash holding can be viewed as determined by a trade-off between costs and benefits of having liquid assets to derive an optimal cash level. The optimal cash level should be the point where marginal costs of cash just offset the marginal benefits. Previous studies demonstrate that cash holding can be viewed as a target-adjustment model where corporate cash holdings are periodically adjusted to the target level (Ozkan and Ozkan, 2004, and Garcia-Teruel and Martinez-Solano, 2008).

Under the perfection assumption of capital markets, no adjustment costs or transaction costs exist, making cash holdings irrelevant to a firm's value. A firm can obtain the required fund whenever it needs and automatically rebalance its cash positions to target levels, when any imbalance exists. In reality, however, there are several capital market imperfections, making the firm's value relevant to cash holdings and consequently, inducing firms to actively manage their cash holdings to maximize value.

In the absence of adjustment cost, firms would always have and maintain their target cash ratio by changing its existing ratio to equal its target cash ratio.[3] On other word, each firm's observed cash ratio should be its optimal ratio. However, the presence of adjustment costs may restrict the firm's ability to back immediately to its target level. Thus, when the observed level of cash deviates from its optimal level, firms will gradually adjust that level to the optimal level in a process referred to as the partial adjustment process (Jalilvand & Harris, 1984; Taggart, 1977). The partial adjustment mechanism allows for firms' observed cash ratio not always being equal to their optimal level. Hence, the dynamic trade-off theories not the static trade-off theory that will be able to capture the dynamic change in firms cash holdings. Dynamic behavior exists because the presence of market frictions may limit the firm's ability to manage their cash level, causing them to deviate from optimal levels and consequently increasing the need for target reversion to maximize value (Kim *et al.*,2011)

Moreover, it may not be appropriate for firms to immediately adjust their target deviations when the cost of moving toward target level is higher than that of being away from the target (Alles *et al.*, 2012). This suggests that firms will make target-reversion when the benefit of moving toward the target level is higher than the cost of being away from the

[3]Adjustment costs are the costs of liquidating assets.

target. In addition, Bruinshoofd (2009) found that firms increase their level of cash holdings from an insufficient level to a target level more rapidly than they decrease their level from an excessive level to a target level. Therefore, firms are very concerned about the speed by which they move toward their target cash levels because of high adjustment costs. Few studies recognize and incorporate the dynamic nature of cash holdings.

Another trend of research appears to examine the existence of partial adjustment model of cash holding. Whether adjustment frictions, such as those that affect capital structure decisions, influence cash holding decisions is an important research question because of their consequences on the shareholder wealth which associated with deviating from optimal levels of liquid assets, especially for financially constrained firms (Denis & Sibilkov, 2010).

Bruinshoofd and Kool (2004) collect data from Dutch firms and investigate the existence of long-run liquidity targets. Depending on the empirical methodology, they document that the rates of annual target convergence range from 20 percent to over 60 percent which supports the dynamic nature of the cash-holding decision, which is characterized by a trade-off between the costs of deviation from the target and the costs of adjustment. Slow adjustment process is attributed to adjustment cost and

therefore a firm's actual cash level is not necessarily identical to the desired cash holding level.

Ozkan and Ozkan (2004) estimate a partial adjustment model of cash holdings for a sample of U.K. firms and find that a dynamic model of cash holding behavior is better suited than the static models employed in the extant literature. They find that the estimated target-adjustment coefficient has a positive value of 0.54, implying that UK companies adjust their target deviation too quickly and supporting the view that firms always adjust toward a target cash ratio.

Drobetz and Grüninger (2006) analyze Swiss firms' speed of adjustment towards an endogenous target cash ratio, using dynamic panel estimation. They find that the speed of target adjustment of Swiss firms is between 0.35 and 0.5, indicating that Swiss firms adjust their liquidity holdings more slowly towards an endogenous target cash ratio than firms in other countries. They suspect that the most reasonable explanations are based on the strong influence of banks in Switzerland and/or the unfavorable economic conditions during the sample period that entail low costs of deviation from the target.

Guney *et al.*(2006) investigate corporate cash holding behavior in Japan, France, Germany, and the UK using data for 3,989 companies over the period 1983-2000. Their findings reveal that the dynamic cash holding analysis indicates that firms tend to adjust their cash levels towards a

target cash structure. The speed of adjustment of cash holdings for France, Germany and Japan is found to be similar (adjustment coefficient is approximately 0.5),while firms in the UK seem to adjust to the target cash level more quickly. This possibly, may suggest that when adjustment costs are higher, resulting in lower speeds of adjustment. According to their study, the lower speed of adjustment for Japan and Germany can be explained by the fact that German firms and Japanese firms have close ties with their banks and depend on them for external financing. It is feasible for them to adjust slowly towards their target level without incurring a high level of agency cost. Overall, the results lend strong support to the dynamic nature of the cash holding decision of firms. Firms tend to trade-off between costs of speedy adjustment and costs of delay in achieving the target cash structure.

Empirical studies also indicate that the speed of adjustment towards target levels varied among different samples with different firm characteristics and at different cash positions. For example, using a dynamic adjustment model to analyze the cash-holding behavior of small and medium-sized firms (SMEs) in Spain, a less developed country, **Garcia-Teruel and Martinez-Solano (2008)** find that SMEs aim to achieve a target level of cash holdings and that they adjust their actual level towards the target level more rapidly than large firms do in developed countries.

Another related study by **Jiang and Lie (2010)**, they estimate that firms close about 36% of the gap between actual and target cash ratios each year. They further document that across all sample firms, the adjustment speed is slower if the cash level is above the target than if it is below. They interpret this as an evidence that self-interested managers are reluctant to disburse excess cash, and will allow cash levels to remain high unless they are subject to external pressure and this is consistent with the argument of Opler *et al*. (1999).

Venkiteshwaran (2011) estimates a dynamic model that allows firms to adjust their cash holding levels over time and find an evidence consistent with trade-off type behavior in cash holding levels. Using a sample of U.S. manufacturing firms between 1987 and 2007, he finds a very strong mean reversion in cash holding levels to optimal levels and that any deviations from optimal cash levels are rapidly corrected, typically within two years for the average firm in the sample. He estimates a partial adjustment model using a Generalized Method of Moments (GMM) estimation procedure originally formulated by Arellano and Bond (1991). He also finds that this adjustment rate is faster for small, financially constrained firms than for larger firm consistent with the expectation that constrained firms may find it more costly to operate at sub-optimal levels of cash. Further he finds that firms with excess cash are slower to return to optimal levels than firms that have cash deficiencies. His findings are

similar to those reported in Ozkan and Ozkan (2004) for a sample of U.K. firms but inconsistent with the finding reported by Dittmar and Duchin(2011) for U.S. firms who report a slower adjustment rates for a broader sample of firms; firms need three to six years to correct any deviations from optimal levels. They also find that on average cash deficient firms are slower to adjust to optimal levels compared to firms with surpluses and attribute this finding to asymmetric adjustment costs associated with building versus spending cash reserves.

2-4 The existence of optimal cash holding in Jordan

As Jordan is one of developing countries, its capital market is small, thin and not perfect, suffering from the lack of competition, liquidity, monitoring and regulations with low levels of transparency and investors' protection (Zurigat & Gharaibih, 2011). Moreover, the presence of capital market frictions such as bankruptcy, agency and information costs is possible, making Jordanian listed firms find difficulties to raise external funds, increasing their reliance on internally generated funds, and consequently affecting their decision to hold cash. This implies that holding cash for financing helps firms avoiding the shortage of external financing and thereby, underinvestment problem.

The investigation of cash holdings behavior in a country such as Jordan is characterized by many features. Jordanian economy is

characterized by being a market oriented economy with limited natural resources. The kingdom has no oil and lacks water. Phosphates are its only extensive natural deposit. It is small open economy subject to external shocks and dependent on workers' remittances and foreign aids. The key challenges facing Jordan are the kingdom's high budget deficit, its heavy reliance on foreign grants, high unemployment rate, high poverty level, high population growth rate and its vulnerability to external shocks, such as changes in oil prices (IHS Global Insight Inc , Jordan country report 2012).

From 1989–2004, the Jordanian government successfully completed a series of IMF-backed programs aimed at promoting growth, reducing the public debt burden, and implementing economic reforms. Privatization, structural reform, and fiscal constraint were combined with rising reserve levels, lower interest rates, and a strengthening of demand for dinar-denominated assets. The country was rewarded with full membership in the World Trade Organization (WTO) in 2000 (Jaradat, 2010) .

According to Jaradat (2010), the Jordanian authorities have moved ahead with a privatization program aimed at attracting domestic and foreign investment, enhancing efficiency, and creating employment opportunities. Indeed, reforms to the regulatory, customs, and tax environments have opened Jordan up to increasing flows of foreign investment.

Beginning of 2005, the economy was negatively affected by the sharp increase of international oil prices combined with a drop of external grants. This period was marked by exceptional economic condition and their negative impact on the performance of the economy, in addition to the negative impacts of global crisis in an economy open to the global economy and market open to foreign investment on a wide. This reflects a state of alert and warned anticipation on the investors decision. These factors encourage firms to seek for new source of financing. The banking sector was the main source of financing for the industrial, services and commercial operations in Jordan (Suwaidan & Al-Khouri, 2000). But as a result of the international financial crisis, the Jordanian banking sectors adopted conservative credit policy and followed a strict policy in the requesting for guarantees which reduces the funds available for financing. In this context, the Central Bank of Jordan (CBJ) tries to maintain adequate level of liquidity in the banking system and motivate the banks to extend the credit facilities in the economy especially that the main problem with ASE is the lack of liquidity. There's difficulty to liquidate stocks.

The main characteristic of the investment environment in the ASE is uncertainty and people do not have confidence in the stock market. This means that insufficient amount of cash forces firms to give up profitable investment projects or to support abnormally high costs of

financing. So from here stems the importance of cash holding decision as a source of financing.

Considering that Jordanian firms are moving towards market orientation, the study assumes that dynamic adjustment process of corporate cash holdings could be applied to Jordanian firms which allow for lags in adjustment and allow for systematic changes in determinant of optimal cash level. However, the presence of many frictions in the ASE may restrict firms from making quick adjustments due to the higher transaction costs involved. Based on that, actual cash holdings often differ from the optimal level that predicted by these factors.

2-5 What distinguish this study from previous studies?

There are several important features of the current study which may contribute to the literature on the empirical estimation of partial adjustment model of cash holdings of firms.

First, it focuses on Jordanian industrial firms listed on the ASE which is considered as emerging markets with reduced availability of data. The literature does not provide considerable research on determinants of corporate cash holdings in developing countries. This study aims to shed light on the determinants of Jordanian firms' cash holdings by analyzing the behavior of firm specific factors with respect to corporate cash holdings in Jordan.

Second, the study extends the approaches used in most recent studies to investigate the existence of optimal cash holdings level. The majority of previous studies focused mainly on the cash holdings determinants. Very few studies tested the existence of target cash levels.

Last but not least, it tries to extend the literature by testing the hypothesis of symmetric partial adjustment toward the target cash level.

For this purpose and besides the static cash model, this study incorporates the dynamic nature of the firms cash holdings to investigate whether Jordanian firms adjust toward target cash holdings overtime and how fast such an adjustment is by testing partial adjustment model of the cash equation, where the target adjustment coefficient will be estimated assuming that cash target exists and that firm adjust the level of corporate cash holdings over time toward that target.

Chapter Three

Data and Research Methodology

3-1 Introduction

This study aims at investigating the existence of target adjustment toward the optimal cash holding of industrial firms listed in the ASE over the period 2001-2010. The current chapter presents the methodology used to accomplish this objective. Section (3-2) includes data collection methods. The study sample and sample selection criteria are discussed in section (3-3). Section (3-4) provides the theoretical and empirical background of the study variables with their definitions, measures and formulating the hypothesis. Furthermore, it introduces empirical models specifications. Finally, the target adjustment model of cash holdings is introduced in section (3-5).

3-2 Data collection

The study uses pooled and panel data analysis which is usually estimated by either fixed effect or random effects technique. Data for pooled and panel analysis is extracted from firms' annual reports, the ASE publications and website. The data of the study is constructed to cover the period of 2001 to 2010 on annual basis.

3-3 Sample of the study

The population of the study consists of all Jordanian firms listed on the ASE during the period 2001- 2010. The total number of companies listed on ASE at the end of 2010 is 277.These companies are divided into three main economic sectors, the financial sector, the services sector and industrial sector.

Consistent with the previous literature, the current study excludes all service and financial firms. The reason for excluding the financial sector (banking and insurance) because their liquidity is hard to assess and their different capital structure and income taxes (see, Rajan & Zingals, 1995 and Lesfer, 1995). Harford (1999) finds that these firms have significantly higher cash holdings. Therefore, excluding firms operating in financial sectors would be desirable because these firms are expected to have different reasons for holding liquid assets (Verlag ,2004).

Hence, the sample is limited to the industrial sector and is constructed using the following sample selection criteria:

1. All firms engaged in merger or acquisitions during the study period are excluded.
2. All firms with missing data are excluded.

3. All firms that have been liquidated or stopped their operation (whose stocks are desisted in ASE throughout the study period) are excluded from the sample.
4. All firms that have been incorporated after year 2000 are excluded.

After applying these criteria, the final sample is confined to 57 industrial companies which constitute a significant proportion of listed companies in the ASE (appendix (1) shows the names of Jordanian industrial companies included in the study).

This period (2001-2010) was marked by exceptional economic condition and the movement of Jordanian economy towards the free market economy , in addition to the negative effects of global crisis on Jordanian economy ,which may reflect a state of alert and warned about the cash holding decisions and may provide opportunities for Jordanian industrial firms to determine their optimal cash level and move toward their target level if any deviation from that target exists.

The industrial sector has been selected by the researcher, because it is attractive to investors as it is considered as one of the vital and largest economic sectors in Jordan in terms of the percentage of its contribution to the Gross Domestic Product (GDP) which amounted to 26.2% for the year 2009(CBJ, 2009).

3-4 Determinants of cash holdings and hypothesis development

As the current study aims at investigating the target adjustment path of Jordanian firms, the conventional cash equation is used to estimate the target cash holding. This is because the target cash holding itself is unobservable. Previous studies have analyzed determinants of cash holdings assuming implicitly the existence of optimal cash holding (Opler *et al*., 1999; Kim *et al.,* 1998).In addition, Opler *et al*.(1999) estimate the optimal cash holding as a moving average of past cash holding levels. Other studies such as Bates *et al*. (2009) and Dittmar & Mahrt-Smith (2007) identify firm and industry level variables that are posited to affect how much cash a firm should hold and obtain fitted values from the estimated relationship between these variables and the actual cash holding of firms (Venkiteshwaran, 2011).

The most important studies that have addressed the determinants of corporate cash holdings were conducted by Kim *et al.* (1998), Opler, *et al.* (1999) Ozkan & Ozkan (2004); Ferreira & Vilela (2004); Garcia-Teruel & Martinez-Solano (2008) and others .

Consistent with the majority of previous studies (e.g. Opler *et al.,* 1999, Dittmar *et al.*, 2003, Kalcheva & Lins, 2003, Ferreira & Vilela, 2004 and Bates *et al.,* 2009) which have identified a set of firm specific characteristics that influence the target level of cash holdings of firms, the current study uses firm specific characteristics as predictors for target

cash holdings of listed Jordanian firms. Therefore, this section reviews the determinants of cash holding level, presents their definition, denotation and measurement of each variable with presentation of hypothesizes. The set of variables that will be used in this study are primarily guided by the results extracted from previous empirical studies done on developed and developing countries.

It is worth noting that the selection of explanatory variables in the current study is based on alternative theories that might be responsible for the corporate cash holdings and can be found in the literature. However, the choice is sometimes limited, due to lack of relevant data. Following Opler *et al.,* (1999) and Bates *et al*., (2009) in the selection of independent variables, the following variables are selected; firm size, growth opportunity (the market to book ratio), cash flow, net working capital, capital expenditure, leverage ratio and profitability. The study analyzes these variables in terms of their definition and their theoretical background.

1- **Firm size**:

The impact of size on cash holding is still ambiguous. However, different explanations are given as to why the firm's size affects its cash holding. Miller and Orr (1966) and Peterson and Rajan (2002) argue that raising funds is more expensive for small size firms than for large-size

firms. Hence smaller firms tend to hold more cash than larger ones (Ferreira & Vilela, 2004). The reason are mainly attributed to the fact that large firms are more diversified and less prone to financial distress and hence have less need for holding cash (Rajan & Zingales, 1995). Moreover, large firms exhibit less information asymmetries than small firms, and therefore, they face lower costs of external financing (Brennan & Hughes, 1991; Fazzari & Petersen, 1993). Ozkan and Ozkan (2004) provide an evidence that support these arguments. Their evidence suggests that large firms hold less cash than small firms do because they are more likely to be diversified and, hence, less likely to experience financial distress. In contrast, Opler *et al*. (1999) argue that larger firms presumably were more successful and therefore, they have been able to accumulate higher cash reserve (Drobetz & Grüninger,2006). Based on the above analysis, the current study hypothesizes that the size negatively impacts the level of cash holdings. Following Ozkan & Ozkan (2004) and Opler *et al*. (1999), the current study uses the natural logarithm of total assets as proxy for the size of the firms.

H1: Firm size has a significant negative impact on cash holdings.

2- **Leverage**;

The effect of firm leverage on cash holdings is unclear. On the one hand, one would expect a positive relationship between leverage and cash holdings, since a highly leveraged firms are likely to face financial

distress. This suggests that these firms hold more cash in order to reduce the probability of bankruptcy. On the other hand, if leverage is used as an index for the ability to obtain debt then the more leveraged the firm is, the lower its need to hold cash (Ferreira & Vilela, 2004). To the extent that leverage ratio acts as a proxy for the ability of firms to issue debt, one would expect a negative relation between leverage and cash holdings (Kim *et al*., 2011). The pecking order hypothesis, given by Myers & Majluf (1984), also suggests a negative relationship between cash holdings and leverage. The empirical evidence for negative relation is found in Kim *et al*. (1998), Opler *et al*. (1999) and Ozkan & Ozkan (2004). This suggests that leverage is negatively related to the level of cash holdings. Following Kim *et al.* (1998), Opler *et al.* (1999) and Ozkan & Ozkan (2004) leverage is measured by the ratio of total liabilities to total assets.

H2: Leverage has a significant negative impact on cash holdings.

3- Growth opportunities:

According to the trade-off theory, the existence of investment opportunities has a positive impact on firms' target levels of cash holdings. Shah(2011) argue that according to information asymmetry hypothesis, a positive relationship is expected between growth opportunities and investments in liquid assets. Moreover, firms with high investment opportunities hold cash so as to minimize the likelihood of

forgoing future investment opportunities. Kim *et al.* (1998), Opler *et al.* (1999), Ferreira & Vilela (2004), Ozkan & Ozkan (2004), and Guney *et al.* (2007) suggest that growth opportunities in firms is an important determinant that positively affects cash holdings. In the light of all of these factors, the study could expect a positive relation between a firm's cash level and its growth opportunities, so the firms with relatively more growth opportunities tend to hold higher level of liquid assets. For the purpose of this study, the market-to-book ratio will be used as proxy for growth opportunity. The higher the market-to-book ratio, the higher are the cash holding in the firm.

H3: Growth opportunities have a significant positive impact on cash holdings.

4- **Net working capital(NWC)** :

Since net working capital consists of assets that can be easily converted into cash and hence can be a substitute for it. This suggests a negative relationship between net working capital and cash holdings (Ozkan & Ozkan, 2004). Ozkan & Ozkan (2004) indicate that firms can use their non-cash liquid assets, defined as net working capital minus cash and marketable securities to substitute for cash holdings. Opler *et al*. (1999) state that net working capital can be a substitute for cash. Ferreira & Vilela (2004) investigate that cash held by firm is negatively affected by the amount of liquid asset substitutes**.** Also Bates *et al*. (2009) and Tong

(2006) found a negative relationship between cash holdings and net working capital. Thus the study expects a negative relation between NWC and cash holdings. NWC is measured as current assets, net of cash, minus current liabilities as measured by (Bates *et al*., 2009).

H4: NWC has a significant negative impact on cash holdings.

5- Cash flow:

The trade-off theory assumes that cash flow and cash are negatively related. Kim *et al.* (1998) claim that the relation is in fact negative, as firms can use their cash flow as a ready source of liquidity to finance their investments. Also, because access to external financing is greater for firms that are able to generate internal financing (i.e., cash flow), these firms require fewer cash reserves (Alles *et al*., 2012) . Thus cash flow can be seen as a cash substitute and would be negatively correlated to cash level (Saddur, 2006).On other hand, Myers & Majluf (1984) insist that under existing of information asymmetry, firms will establish a hierarchy in their use of funding sources. So, according to hierarchy or pecking-order theory, firms consider internally generated funds as the firms' first choice of financing due to their low outgoing costs and ready availability.

This assumption of the pecking-order theory have received an empirical support from research conducted in many countries (Anderson, 2002; Dittmar *et al*., 2003; Pinkowitz & Williamson, 2001) . Opler *et al.*

(1999) and Ozkan & Ozkan (2004) confirmed that firms with larger cash flows will keep higher cash levels, as is proved for the US and British markets respectively, and it also proved for European Monetary Union (EMU) countries by Ferreira & Vilela (2004). In this study, it is hypothesized that cash flow and cash holdings are positively related. Thus, all other factors being equal, the higher the level of cash flow, the higher the level of cash that firms maintain. In this study, cash flow is defined as net cash flow from operating activities. Operating cash flow is calculated by a relatively simple equation: EBIT (earnings before interest and taxes) + Depreciation- Taxes.

H5: Cash flow has a significant positive impact on cash holdings.

6- Capital expenditures to assets

Bates *et al*. (2009) state that capital expenditures might increase debt capacity and hence reduce the demand for cash because capital expenditures help acquire assets that could serve as collateral for debt. Lee and Song (2007) find a negative relationship between capital expenditures and cash holdings, for firms after the Asian Financial crisis. Moreover, Daher (2010) predicts a negative relationship since capital expenditures consume cash. In contrast, Opler *et al*. (1999) find that cash holdings increase with capital expenditures because, capital expenditures could be proxy for financial distress costs and investment opportunities,

in which case they would be positively related to cash. The current study hypothesis that capital expenditures and cash holdings have a negative relationship as predicted by the pecking order theory. For the purpose of current analysis capital expenditures is measured as the yearly change in fixed assets added to depreciation as used by Bates *et al*.(2009) and Daher (2010).

H6: Capital expenditure has a significant negative impact on cash holdings.

7-Profitability

The theoretical predictions with regard to profitability are ambiguous. On the one hand, the trade-off theory predicts a negative relationship between profitability and cash holdings since profitable firms have enough cash flows to avoid underinvestment problems (Kim *et al*., 1998; Ozkan & Ozkan, 2004). A strong cash flow reduces the need for holding cash reserves which implies that profitability can be a substitute to cash holdings (Kim *et al.*, 1998). The pecking order theory on the other hand predicts the opposite as increasing profits for the firms will increase the company's liquidity and also will decrease the size of the debt in the company. Ferreira and Vilela (2004) find support for the pecking order theory rather than the trade-off theory for cash holdings. The same result is found by Almeida *et al*. (2004) for financially constrained firms.

However, Bates *et al*. (2009) find a negative relationship between profitability and cash holdings. This study expects to find a positive relationship between cash holdings and a firm's profitability, since a profitable firm will have comparatively strong cash flows from operating activities (Shah, 2011). The profitability is measured as the ratio of earnings before interest and tax (EBIT) divided by total assets.

H7: Profitability has a significant positive impact on cash holdings.

The current study employs the following static model to investigate the determinants of optimal cash holding of listed Jordanian industrial firms on the Amman Stock Exchange. In this model, the observed cash holding is modeled as a function of the various firm-specific factors have been discussed above.

$$Cash_{it} = \lambda_0 + \beta_1 Grth_{it-1} + \beta_2 FSiz_{it-1} + \beta_3 NWC_{it-1} + \beta_4 prof_{it-1} + \beta_5 Lev_{it-1} + \beta_6 Cflow_{it-1} + \beta_7 CExp_{it-1} + \varepsilon_{it} \quad \ldots\ldots 1$$

Where **Cash**: is the dependent variable and measured by the ratio of cash and cash equivalent to total assets (e.g. Kim *et al*., 1998; Opler *et al*., 1999; Ozkan and Ozkan, 2004; Bruinshoofd and Kool, 2004).

Grth is the Growth opportunity and measured by market to book ratio.

FSiz is the Firm size, and measured by the natural logarithm of total assets.

NWC is Net working capital and measured by current assets minus current liabilities minus cash.

Prof is the firm's profitability *and* measured as the ratio of earnings before interest and tax (EBIT) divided by total assets.

Lev is the leverage ratio and measured by the ratio of total liabilities to total assets.

Cflow is the cash flows. Operating cash flows are calculated by EBIT+ Depreciation- Taxes.

CExp is the firm's capital expenditure is measured as the yearly change in fixed assets added to depreciation.

ε is the error term which represents all random variables that not included in the model .

3-5 Target adjustment model of cash holding.

To investigate whether Jordanian listed industrial firms have targeted cash ratio and move gradually toward their target ratio when their target deviations exists, the static-partial adjustment models are adopted. Prior studies have used several methods to estimate the adjustment speed for cash levels. This study will follow the theoretical framework developed by Opler *et al*. (1999), who argue that firms' optimal cash holdings are determined by the tradeoff between the marginal costs and benefits of holding liquid assets. They emphasize on the persistence of cash holdings and the existence of implicit target cash

levels. They test the validity of the static trade-off theory, using a partial adjustment model to provide evidence for the presence of target level of cash holdings. The underlying assumption of this model is that, firms optimally balance the costs and benefits of cash holdings to maintain their target level of cash reserves. Moreover, firms may not be always at equilibrium at their target level of cash holdings. A delay in target adjustment exists because of its adjustment costs (Nicolusc, 2005). The presence of adjustment costs may restrict the firms' ability to make target reversion immediately, suggesting the occurrence of partial adjustment toward the target level (Opler *et al.,* 1999; Kim *et al*., 1998).

Hence, the firms' observed cash ratio will be at their target level only if no adjustment costs exist. The speed of target adjustment, when target reversion exists, depends on the adjustment cost as well as on the cost of being away from the target level (the benefits of moving back towards the target level). In reality firms may not completely close the gap between their actual and target levels of cash holdings because it may not be effective to do due to the existence of market friction (Alles *et al.*, 2012). More precisely, firms may keep the gap between their observed cash holding and target level if the cost of being away from the target is lower than that of moving toward the target and vice versa (Dittmar & Duchin, 2010).

Following Ozkan & Ozkan (2004) and Garcia-Teruel & Martinez-Solano (2008), the partial adjustment model of cash holding can be formalized as follows:

$$CB_{it} - CB_{it-1} = \lambda\left(CB_{it}^{*} - CB_{it-1}\right) \text{..............................2}$$

Where, $CB_{it} and CB_{it}^{*}$ denote the actual cash holding and the target cash holdings for firm i at time t. $CB_{it} - CB_{it-1}$ is the difference between a firm's actual or observed cash holdings between year t and year t-1. The expression $CB_{it}^{*} - CB_{it-1}$ is the deviation of a firm's cash holdings from its target level of cash holdings indicating that the target adjustment is required to reach the optimal level.

Finally, estimating a dynamic panel data model of cash holdings taking in to the account the dynamic nature of cash level, will help to analyze the speed of adjustment of Jordanian firms towards an endogenous target cash ratio. Unlike the static model that implicitly assumes that firms can instantaneously adjust their cash holdings toward the target levels, the dynamic model recognizes that an adjustment process may take place and there are some lags for firms to adjust their cash holdings to their target levels (Gao *et al.*, 2010). By extending the static model, the study estimates the speed of adjustment towards an endogenous target cash ratio in a dynamic panel model.

For the purpose of target adjustment estimation, model 2 will be re-formalized as follows:

$$\Delta CB_{it} = \lambda_0 + \lambda_1 TRDCB_{it} + \varepsilon_{it} \text{...3}$$

Where ΔCB_{it} is $CB_{it} - CB_{it-1}$, $TRDCB_{it}$ is $CB^*_{it} - CB_{it-1}$ and used to measure how far the actual cash ratio deviates from the target cash ratio. ε_{it} is the error term and assumed to be independently distributed with zero mean.

In this study, $\lambda 1$ is used to capture a firm's ability to adjust to its target cash holdings, $\lambda 1$ should be statistically significant and between zero and one, not zero nor one ($0 < \lambda < 1$) implying that the movement toward the target is not a costless process. At one extreme, when $\lambda 1 = 1$, the model implies that firms can immediately adjust to their target levels. Such immediate adjustment is possible only in frictionless perfect capital markets that impose no adjustment costs. At the other extreme, when $\lambda 1 = 0$, the model implies that adjustment costs are so large that firms cannot adjust their actual level of cash reserves (Alles *et al.*,2012).

In general, this class of model is used to describe the adjustment process toward target levels of corporate cash holdings taking in to account that the deviations from target cash ratio are not necessarily offset quickly. The reason for this is that cash holding decisions may be affected by the existence of market imperfections such as information

asymmetry, agency conflicts or the existence of transaction costs incurred by accessing the capital markets (Garcia-Teruel & Martinez-Solano, 2008).

It is worth noting that all empirical models will be tested using pooled and panel data analysis. However, discussion will be restricted to the one that has been found the best specification for the current data set. The panel data analysis is usually estimated either fixed effects or random effects technique. The advantages of panel data technique over the pooled data analysis method is that it helps researchers to minimize the problems that arise when there are omitted variable problems such as time and individual-specific variables (Gujarati, 2003).

The presence of time and individual-specific variables makes pooled (OLS) analysis inefficient. Lagrange Multiplier Test (LM) and Hausman specification Test are used to identify which model will be the best specification for analyzing the study data. To make sure that the current data set meets the underlying assumptions of multiple regressions, the study tests for Multicolinearity, using Variance Inflation Factor (VIF) test, and for Heteroskedasticity problem, using Breusch-Pagan Lagrange Multiplier test. The presence of Multicolinearity and Heteroskedasticity problems makes the estimation results misleading.

Chapter Four

Estimation Results and Analysis

4-1 Introduction

This chapter aims at analyzing the estimation results of empirical models used in the current study to accomplish the study objective. Therefore, it presents the results of descriptive statistics of the variables used in the study, as well as, the estimation results of empirical model using panel data analysis, which can be estimated using the Fixed Effect Model and the Random Effect Model.

4-2 Descriptive Statistics

This section presents the most important descriptive statistics of all variables used in the current study such as the Mean and Standard Deviation. The results of descriptive statistics are reported in table (4-1).

Table 4-1: Descriptive Statistics of Key Variables

Variable	Mean	Std .Dev.	Min	Max
CH	.065	.092	0	.485
Cflow	.047	.114	-.349	.615
CExp	.144	.290	-.888	3.582
Lev	.321	.204	.0044	.9447
NWC	.177	.203	-.65	.764
Fsize	16.47	1.321	13.662	20.731
Grth	1.51	.935	0	4.9
Prof	.045	.103	-.587	.515

The results presented in Table 4-1 show that:

- The average of cash holdings (mean cash ratio) in Jordanian industrial firms is approximately 6.5% with standard deviation equal to 0.092. This ratio has ranged between 0 as a minimum percentage and 48.5% as a maximum percentage. This indicates that there are great differences in the percentage of cash holdings among industrial companies listed on the ASE. This may be due to the repercussions of the global financial and economic crisis which adds more blur and uncertainty about the status and performance of most of these companies. The most prominent consequences of this crisis on the industrial sector in Jordan was higher production costs due to higher prices of electricity and industrial fuel and stresses of the banking system in the granting of credit facilities, which led to decline in the competitive of some industries .

This ratio of cash holdings is as same as what is found with Refaee (2012) showed that the ratio of cash to the total assets for Jordanian industrial firms is around 6.5%. The relative small cash ratio of Jordanian firms may be attributable to the constraints on the retained earnings and dividends requirement. Also this ratio is in line with the Garcia-Teruel & Martinez-Solano (2008) in Spain, 6.57%. However, it is less than the values reported by Dittmar & Mahrt-Smith (2007) who

report a mean of 22% for a sample of firms between 1990 and 2003 in USA market and less than values of 8.1%reported by Kim *et al*. (1998) in the same market of (USA).

These differences in the cash ratios means there is a significant variation in the proportion of cash between different countries. This can be interpreted according to different reasons as clarified by Drobetz & Gruninger (2006).According to them, they summarize the most important reasons for these differences in cash level. For the UK, Ozkan & Ozkan (2004) investigate the association between management ownership and cash holdings. Pinkowitz & Williamson (2001) explain the difference between Japanese and U.S. cash holdings by the monopoly power of Japanese banks that persuade firms to hold large cash reserves. Dittmar *et al*. (2003) argue that the differences in cash holdings are attributable to differences in the corporate governance structures across countries. However, the findings of Kalcheva & Lins (2003) do not support the prediction that cash holdings are more valuable for firms in countries with underdeveloped financial markets. Similarly, Harford *et al.* (2008) report that U.S. firms with weaker shareholder rights tend to have a smaller cash reserves (Drobetz & Gruninger, 2006).

- Jordanian industrial firms, on average, have low profitability where the mean value is amounted to 0.045 with standard deviation of 0.103. The

profitability variable shows a high deviation in its observations with minimum value of -0.587 and maximum value of 0.515. This low profitability may be attributed to the country's poor economic condition, global financial crisis and the political unrest in the region.

- The growth variable, which is measured by the market to book ratio, shows a mean value of 1.51 with standard deviation of 0.935. This ratio ranged from 0 at a minimum and 49% at a maximum which shows a wide disparity in the rates of growth opportunities among industrial companies. This may be the result of the difference in the ability of these companies to get adequate funding to finance their investment opportunities.

- The average ratio of net working capital to assets for industrial companies in Jordan is equal to 0.177 and with standard deviation estimated to be 0.203. This ratio ranged between -65% as a minimum value and a maximum of 76.4%. This large variation in the net working capital ratio may be due to the differences in the amount of current assets from one company to another. Companies that have a positive net working capital are companies with high liquidity because their current assets are greater than their current liabilities, while companies with negative working capital are suffering from lack of liquidity.

- Leverage which is measured by total liability divided by total assets has a mean value of 32.1% with standard deviation value of 0.204. This ratio ranged between 0.44% as a minimum value and 94.5% as a maximum value (approximately). This difference may be attributed to reasons linked to the varying profitability and risk levels for these firms which may limit their ability to get an external financing.

- The average size of the company reached 16.47 and an estimated standard deviation of 1.321. The difference in the size of the companies attributed to the difference in the size of the total assets for each company from the other, because the study uses the natural logarithm of total assets as proxy for the size of the firms.

- Average cash flows have value of 4.7% and standard deviation estimated 0.114. This low average cash flow may attributable to the current economic condition in the region in general and in Jordan in particular, which affect the value of the cash flows generated from operating activities.

- Average ratio of capital expenditures to assets equal to 14.4% with an estimated standard deviation of 29%, this ratio ranged between -88.8% minimum value and up to a maximum of 35.8%(approximately). This

clearly shows the great disparity in capital expenditures between industrial companies in Jordan because of the different size of the fixed assets and depreciation from one company to another.

4-3 Regression results

This section consists of two sub-sections. The first one presents the estimation results of conventional cash holding equation; the equation that has been used in the current study to estimate the fitted values of cash holdings as a proxy for the target cash level. The second one presents the estimation results of partial adjustment model.

4-3-1 Estimation results of conventional cash equation.

The result presented in table (4-2) suggests that the fixed effect model is found to be the best specification of the study's data set. The significant Lagrange Multiplier (LM) test implies that the panel data analysis is better than pooled OLS analysis, suggesting the presence of firm and time specific effect, and hence, OLS regression will not be efficient to estimate study empirical model. The Ch^2 value of LM test is estimated to be 138.09 with *p*-value of 0.000. However, Hausman test suggests that the fixed effects regressors will be better than random effect regressors to greater efficient estimation results. This finding is confirmed by the insignificant value of Hausman CH^2. It is found to be 18.5 with a *p*-value of 0.000. Moreover, the results of diagnostic tests for

Multicolinearity and Heteroskedasticity indicate that the empirical models have no Multicolinearity and Heteroskedasticity problems. The results of VIF show that the mean value of VIF for all variables included in the model is 1.20, since the VIF for all variables are ranged between (1.07 – 1.25) which indicates that the model may not suffer from Multicolinearity problem. With respect to the Heteroskedasticity problem, Breusch-Pagan test is found to be statistically insignificant, implying that the variance of residuals is homogeneous, and hence no Heteroskedasticity problem exists for the sample of the study.

The results presented in Table (4-2) show the determinants of optimal cash holdings in Jordan. They are generally similar to those documented in the empirical studies in both developed countries and other developing countries. Table (4-2) reveals the estimation results of model (1). Discussion will be restricted to the model which has been found the best specification for the current data set.

- There is a significant positive relationship at 1% between firm's cash holdings and cash flow (Cflow). This result is in line with the findings of Ferreira and Vilela (2004), Afza and Adnan (2007) and Alam *et al.* (2011) who found a positive relationship between cash flow and cash holdings. This supports the idea that, in the presence of information asymmetries, firms prefer to finance their new investment opportunities with internally generated resources (Garcia & Solano, 2004). In addition,

these results are in the line with those of Pál and Ferrando (2010), since they have found that all types of euro area firm, regardless of their financing conditions, display a positive sensitivity of cash holdings to cash flow. However , Guney *et al*.(2006) found that the impact of cash flow is negative and significant for the UK firms .

Table (4-2) the estimation results of study's models

Variable	FEM	REM
Cflow	0.0251 (0.002)	0.0276 (0.000)
CExp	0.0249 (0.438)	0.02443 (0.439)
Lev	-0.0529 (0.000)	-0.0426 (0.000)
NWC	-0.2661 (0.000)	-0.1667 (0.006)
Fsize	-0.03766 (0.086)	0.0012 (0.917)
Grth	0.01754 (0.288)	0.0200 (0.194)
PRO	0.0071 (0.114)	0.00902 (0.035)
Cons	1.259 (0.001)	0.5709 (0.004)
F test	10.29 (0.000)	72.91 (0.000)
R*2	22.17%	20.41%
Hausman test/Chi2	Chi^2 statistic =18.5 Prob(Chi^2) = 0.000	
LM test	$chi^2(1)$ =138.09 Prob > chi^2 0.000	
Hottest	2.51 0.1128	

- With respect to the effect of leverage (LEV) on cash holdings, there is a significant negative relationship at 1% between cash holding and the leverage. The results may indicate that the leveraged firms have lower cash holdings. This is in accordance with the findings of Ferreira &Vilela (2004) that cash and leverage are negatively related. The negative coefficient supports the pecking order theory according to Drobets & Gruninger (2006). But this negative relationship is in consistent with agency theory that highly leveraged firms find it difficult and expensive to neither raise additional funds nor renegotiate existing debts, hence, hold larger cash and induce a positive relationship (Ogundipe *et al*.,2012). Furthermore, Ozkan & Ozkan (2004) also consider that more highly leveraged firms may keep more cash in order to lower their default risk.

- There is significant negative relationship at 1% between cash holding and net working capital. This result is in line with Alam *et al.* (2011) who found a negative relationship between net working capital and cash holdings. Afza & Adnan (2007) and Megginson & Wei (2010) also support that cash holdings is negatively related to net working capital.

- There is significant negative relationship at 10% between cash holding and firm size. This is consistent with Drobetz and Grininger (2007) who found a negative relationship between firm size and cash holdings and Saddour (2006) who found cash levels negatively affected by firm size. Nguyen (2005) also found that cash holdings decrease with the firm size. The results are consistent with those reported in earlier studies.

- Capital expenditure and profitability are also positively correlated with cash level but not significant. This result is in contrast to previous empirical studies (e.g; Ferreira and Vilela, 2004; Ozkan & Ozkan, 2004; Opler *et al*., 1999; Kim *et al.*, 1998). Also growth opportunities (as measured by market to book ratio) are found to be insignificant as cash holding determinants in Jordan in both panel regression models. This is contrary to Nguyen (2005), Saddour (2006) and Afza & Adnan (2007) findings that market to book ratio was significant in determining corporate cash holding. The model predicts that there is a positive relationship between cash holding and growth opportunity based on the precautionary motive, because growth firms will avoid foregoing valuable investment opportunities due to cash shortages (Rettl, 2012). However, the study results provide a weak support for this hypothesis**,** suggesting that the precautionary motive is of little importance for the liquidity of Jordanian firms.

It worth's noting that the conventional cash equation will be used to estimate the target cash holdings level that will be used to calculate the target deviation and then estimating the target adjustment rate. The following section presents the estimation results of partial adjustment model.

4-3-2 The estimation results of partial adjustment model

To investigate whether Jordanian industrial firms have target cash holding and how fast they move toward that target, the study extends the static cash holding model and formulates a partial (dynamic) adjustment model. In frictionless world, firms would always maintain their target cash level. However, market imperfections such as transaction costs may prevent firms from immediate adjustment to their target level of cash holding. Hence, the partial adjustment model will be better than the static cash holding model to capture the dynamic pattern of firms' cash holdings behavior.

The estimation results of this model are presented in table (4-3). As signified by the significant Lagrange Multiplier (LM) and insignificant Hausman tests, the model with fixed effects is the preferred specification. Hence, discussion will be restricted to results obtained by fixed effects regressors.

Table (4-3): the estimation results of partial adjustment model

Variables	ΔCB_{it}		
	Pooled data	FEM	REM
Intercept	-6.58 (-17.62) (0.000)	-6.95 (-18.95) (0.000)	-6.913 (-16.98) (0.000)
$TRDCB_{it}$	0.239 (3.48) (0.001)	0.172 (2.53) (0.012)	0.189 (2.88) (0.004)
R^2	0. 259	0. 159	0. 159
F-statistic	12.13 (0.0005)	6.39 (0.012)	8.27 (0.004)
Observations(n)	458	458	458
Hausman test	Chi^2 statistic = 0.81	$Prob(Chi^2) = 0.3675$	
LM test	$chi^2(1)= 87.62$	$Prob > chi^2 = 0.000$	

As can be seen, the estimation results of model (3) suggests that industrial Jordanian firms are dynamically adjusting their cash holdings towards target levels. More precisely, they have a target cash ratio and move gradually toward that target if any deviation exists. This finding is confirmed by the statistically significant of the $TRDCB_{it}$ variable. However, the results indicate that Jordanian firms adjust their actual cash level slower than do firms in other countries. The estimated coefficient on the $TRDCB_{it}$ variable is found to be, on average, 0.172, implying that

Jordanian industrial firms need 3.7 years to adjust half of the deviation of their actual cash ratios, and 7.2 years to correct totally target deviation.

As the estimated coefficient on the $TRDCB_{it}$ variable measures the speed rate of target adjustment, the speed of target adjustment of Jordanian industrial firms is lower than that of other developed countries. For Swiss non-financial firms, Drobetz& Grüninger(2006) report an adjustment speed rate ranged between 0.35 and 0.50. Ozkan and Ozkan (2004) report 0.6 adjustment rates for U.K firms. Using sample data from U.K., Japan, France, and Germany markets, Guney *et al.* (2003) reports adjustment speed rates of 0.59, 0.57, 0.60, and 0.56 for French, German, UK, and Japanese firms, respectively. Couderc (2005) provides evidence suggesting that adjustment rates differ across countries. The estimated adjustment rates are higher for the U.S. and Canada (over 0.6) than for Germany and France (roughly 0.5) (Drobetz & Grüninger, 2006).

One explanation to the low adjustment speed of Jordanian firms is the presence of adjustment cost. As transaction costs are inversely proportional to the adjustment coefficient, the lower the value of this coefficient, the higher the transaction costs and then the slower the movement toward the target level. For some firms under certain circumstances, the adjustment costs may be so high, that it is not cost effective for them to make any further adjustments, especially when the deviation is close to the target levels (Alles *et al.*, 2012) .The presence of

market frictions in Jordan creates many financial constraints to which the Jordanian firms could generally respond. As Jordanian firms have relatively large transaction costs indicating that these costs are much higher than those of staying away from the target which may prevent firms or even make them reluctant from making quick adjustments due to the higher transaction costs involved, which may affect the overall average adjustment speed. The role of adjustment costs has been emphasized in the context of other financial policies, such as capital structure and investment but has not received attention in the cash literature (Dittmer & Duhin,2010).

Another explanation for the delay in adjustment process is the access to bank credit. According to Zeitun *et al.* (2007), Jordan is a bank-based system and the cost of borrowing is quite high, which makes retained earnings an important source of funds. Thus, a limited source of funding that available for Jordanian firms would have an impact on their cash adjustment ability and means that the mechanisms for Jordanian firms to make their cash adjustments are limited. These findings is consistent with the finding of Dittmer and Duhin(2010) that firms with access to bank credit have significantly higher speed of adjustment of cash. These results are supportive of the "trade-off theory" of cash holdings, under which firms have an optimal cash level, as opposed to the "financial hierarchy hypothesis" of cash holdings.

Chapter Five

Conclusion and Recommendation

5-1 Introduction

This chapter summarizes the main findings of this study and provides the conclusions by analyzing the results using standardized methods that adapted to the nature of the data, in addition to some recommendations and limitation.

5-2 Summary of research result and conclusion

The aim of this study is to examine the speed by which a sample of Jordanian industrial firms adjust cash ratios toward target levels, which, in turn, affect cash balances over the longer term. Using a dynamic adjustment model and panel data for a sample of Jordanian firms over the 2001-2010 periods, this study sheds new light on the determinants of the optimal cash holdings and the speed of adjustment rather than the observed cash level.

In the light of the findings of the study analysis, results can be summarized as follows:

1- Results of the descriptive analysis of the study data indicate that Jordanian industrial companies retain an average 6.5% of their assets in the form of cash for the purposes of investment and financing and

this is consistent with the findings of the study conducted by Refaee (2010). Hardin III *et al.* (2009) explain that less cash in the organizations reduce agency problems. Therefore, Jordanian firms should maintain an optimal level of cash holdings to reduce the agency problem. The results of this study generally support the trade-off theory of cash holdings.

2- Cash flow, net working capital, leverage and firm size significantly affect the cash holdings in Jordanian firms.

3- The level of cash that held by the Jordanian industrial companies is not affected by growth opportunities, profitability and capital expenditures.

4- The relationship between leverage and cash holding is significantly negative in Industrial Jordanian firms. According to John (1993), this can be explained from the fact that firms can use borrowing as a substitute for holding high levels of cash and marketable securities.

5- The study used a dynamic panel to test for the existence of optimal cash holding by employing a partial target-adjustment model to investigate target cash holdings and how Jordanian industrial firms respond in their speed of adjustment to the change in the target cash level. The study findings support that decisions about cash holdings follow a partial adjustment model. Thus, The study finds that firms

pursue a target level for their cash holdings and their decisions are taken in the aim of achieving this objective.

6- The coefficient on the deviation of cash holding variable is significantly positive but statistically different from one. This result confirmed that Jordanian firms attempt to slowly adjust their actual levels of cash reserves toward their target levels, and that the adjustment speed is less than the speed found in listed firms of developed economies. Dittmar & Duchin (2010) find slower adjustment rates for a broader sample of firms across several decades and also find that on average cash deficient firms are slower to adjust to optimal levels compared to firms with surpluses and attribute this finding to asymmetric adjustment costs associated with building versus depleting cash reserves. The results of the current study complements the existing empirical evidence on the cross sectional cash holding patterns and adds to the growing line of research devoted to understanding the dynamic nature of the cash holding decision of firms.

7- The lower speed of adjustment for Jordanian industrial firms can be explained by the fact of high transaction cost for adjusting the deviation from target. This may emerged from the fact that Jordanian industrial firms are depending on equity for financing their investments, where, the equity of Jordanian industrial firms represents

about (70%) from their total finance (Khrawish & Khraiwesh, 2008). It is feasible for them to adjust slowly towards their target level without incurring a high level of transaction cost especially if the adjustment process requires more external financing from the banks. Overall, the results lend strong support for transaction motives which play important roles in explaining the determinants of cash holdings for Jordanian firms.

In conclusion, the results are almost consistent with previous study except for insignificant relation between growth opportunities and profitability and cash holding in Jordan which contradict the previous findings in other countries and may represent a special case of Jordanian firms' cash holding policy. Further research could be conducted using different proxies for growth opportunity in order to explore the true relationship.

5-3 Recommendations

Based on the result of the study, the study recommends the followings:

1- The study recommends that Jordanian firms should increase their cash holdings in an attempt to lower the probability of financial distress and bankruptcy because the insufficient balance of cash holdings may force firms to give up some of the profitable investment opportunities.

2- The study also recommends that the policy makers in Jordan should develop the capital market, increase its efficiency, competition and transparency to increase the firm's ability to generate funds externally.

3- Despite the scarcity of studies on the subject of the determinants of liquidity in Jordan in particular and in developing countries in general, this study may provide a practical guide about Jordanian companies' statues. Further research of the determinants of cash holdings could be conducted to explore the impact of liquidity on corporate performance and profitability.

4- Further research could be conducted to expand the scope of the current study to include other economic sectors (services , banks and insurance) to investigate generalizations of the findings .This would also help to determine the extent of difference in the determinants of liquidity in these sectors and for comparative purposes in the speed of adjustment between various sectors.

5- Regardless, the empirical results dealing with the existence of optimal cash holdings and that any deviation from it can be adjusted slowly, this is considered as an important topic in the literature and open prospects for new research. The study results indicate that the partial adjustment of cash level need to be further examined.

5-4 Limitations

At the end, this study has clear limitations. The most important difficulties faced by a researcher at the collection and analyzing of data is as follows

1- This study is limited to the sample of Jordanian industrial firms. The findings of this study could only be generalized to firms similar to those that were included in this research.

2- In addition, and possibly due the small sample size, the researcher is unable to analyze the effects of firm-specific characteristics on the speed of adjustment to the target cash holding.

3- Finally, the lack of high-quality databases might constitute the major barrier on conducting cash holding research in Jordanian firms. Consequently, there is a need to develop validated databases as more data becomes available in future. Using such databases can help examining and identifying additional variables that could determine the cash holding of Jordanian companies

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APPENDEX (A): LIST OF JORDANIAN INDUSTRIAL FIRMS

INCLUDED IN THE STUDY

Code	Name
1	THE INDUSTRIAL COMMERCIAL & AGRICULTRAL
2	PREMIER BUSINESS AND PROJECTS & CO.LTD
3	JORDAN CHEMICAL INDUSTRIES
4	UNIVERSAL CHMICAL INDUSTRIES
5	INDUSTRIAL INDUSTRIES & MATCH/JIMCO
6	JORDAN SULPHO-CHEMICALS
7	NATIONAL CHLORINE INDUSTRIES
8	JORDAN INDUSTRAL RWSOURCES
9	COMPREHENSIVE MULTIPLE PROJECT
10	INTERMEDLATE PETROCHEMICALS INDUSTRIES CO.LTD
11	NATIONAL CABLE & WIRE MANUFACTURING
12	JORDAN NEW CABLE
13	ARAB ELECTRICAL INDUSTRIRS
14	MIDDLE EAST COMPLEC for ENG,ELECTRONICS&HEAVYINDUS
15	THE JORDAN PIPES MANUFACTURING
16	AL-JANUOB FILTERS MANUFACTURING
17	JORDAN WOOD INDUSTRIES / JWICO
18	ARAB ENGINEERING INDUTRIES
19	READY MIX CONCRTE AND CONSTRUCTION SUPPLES
20	ARABIAN STEEL PIPES MANUFACTURING
21	JORDAN POULTRY PROCESSIND & MARKTING

22	JORDAN DAIRY
23	GENERAL INVESTMENT
24	AL-QARIA FOOD & VEGETABLE OIL INDUSTRIES CO. P. L.C
25	UNIVERSAL MODERN INDUSTRIES
26	NATIONAL POULTRY
27	THE ARAB INTERNATIONAL FOOD FACTORIES
28	NUTRI DAR
29	AMANA FOR AGR & INDUSTRIAL INVESTMENT
30	JORDAN VEGETABLE OIL INDUSERIES
31	JORDAN CERAMIC INDUSTRIES
32	INTERNATIOAL CERAMIC INDUSTRIES
33	THE PUPLIC MINING
34	ARAB ALUMINUM INDUSTRY /ARAL
35	NATIONAL STEEL INDUSTRY
36	JORDAN PHOSPHATE MINES
37	THE JORDAN CEMENT FACTORIES
38	THE ARAB POTASH
39	JORDAN ROCK WOOL INDUSTRIES
40	JORDAN STEEL
41	NATIONAL ALUMINIUM INDUSTRIAL
42	INTERNATIONAL SILICA INDUSTRIAL
43	TRAVERTINE
44	ARAB COMPANY FOR INVESTMENT PROJECTS
45	JORDAN PAPER & CARDBOARD FACTORIES
46	PEARL-SANITARY PAPER CONVERTING
47	DAR AL-DAWA DEVELOPMENT & INVESTMENT

48	ARAB CENTER FOR PHARM & CHEMICALS
49	MIDDLE EASTPHARMA. & CHMICAL IND. & MEDICAL
50	AL-EKBAL PRINTING AND PACKAGING
51	UNION ADVANCED INDUSTRIES
52	THE JORDAN WORSTED MILLS
53	JORDAN TANNING
54	AKARY FOR INDUSTRIES AND REAL ESTATE INVESTMENTS
55	AL-ZAY READY WERA MANUFACTURING
56	AL-EQBAL INVESTMENT COMPANY LTD
57	UNION TOBACOO & CIGARETTE INDUSTRIES